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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/645,807	08/24/2000	Volker Weinrich	GR 97 P 1861 D	4185
24131	7590	03/10/2005	EXAMINER	
LERNER AND GREENBERG, PA P O BOX 2480 HOLLYWOOD, FL 33022-2480			AHMED, SHAMIM	
			ART UNIT	PAPER NUMBER
			1765	
DATE MAILED: 03/10/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/645,807

Applicant(s)

WEINRICH ET AL.

Examiner

Shamim Ahmed

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 December 2004.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14, 21 and 22 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-14, 21 and 22 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 12/14/04 have been fully considered but they are not persuasive.

Applicants argue that Watabe does not teach or suggest preventing the breaking through of the electrode by applying a titanium nitride on the platinum layer during the overetching due to the different depth of the contact holes.

In response, examiner states that the argument is very specific than the claim and further more, the specific electrode configuration is already taught by the primary reference Schuele et al and Watabe teaches forming two contact holes on the insulation layer on the electrode configuration, wherein the contact holes having different depths (see the rejection).

Examiner also states that Watabe teaches the bottom of the contact hole 22 is prevented from being breaking through by controlling the etching rate by changing the size of an opening due to the different depth of the contact holes (see the abstract).

Therefore, it is suggested that the contact holes of Watabe having substantially same diameter as the variation or the changes in the size would have been with in the claimed range of substantially same diameter contact holes.

So, the rejections of the previous office action is repeated herein along with new rejections as follows:

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-14,21-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In claim 1, lines 15-16, the newly added phrase "the contact holes having substantially same diameters" is not supported by the specification. The specification only describes that a plasma etching is carried out to form contact holes 12 and 13 having different depths of the contact holes (see page 18, lines 21-25 of the specification).

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-14,21-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Regarding claim 1, lines 17-19, the phrase "preventing breaking through ---- and formation of redeposition of the material of the first conductive layer **by** the second conductive layer " renders the claim indefinite because it is unclear how the steps of "prevention of breaking through" and the step of "redeposition" occurs?

Are they are the results of the formation of the contact holes with different depths or performing different steps in order to prevent the break through? And the formation of the redeposition of the first conductive material layer.

7. It is also raises a question, whether the redeposition of first conductive material occurs **by** the or on the second conductive layer during the over etching?

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-5,7-9,12-14 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuele et al (5,930,639) in view of Watabe (JP-5-315457) and Hwang (5,621,606).

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As to claims 1, 21-22, Schuele et al disclose a process of precision etching of platinum electrodes in a stacked capacitor, wherein a second conductive layer (44) of titanium nitride is formed on a first conductive layer (38) of platinum (col. 8, lines 10-29 and figure 12).

Schuele et al teach that the first conductive layer is unetchable to chemical dry etching because the material for the first conductive layer is similar as the instant application (see lines 18-21 at page 15 of the instant application).

Schuele et al also disclose structuring the second conductive layer by etching to form a structured second layer (col. 8, lines 50-52 and figure 13).

Schuele et al further disclose that chemical-physical dry etching such as ion milling or RIE is used to etch the first conductive layer using the structured second conductive layer as a mask (col. 5, lines 19-23 and col. 8, lines 66-col. 9, lines 3).

Schuele et al teach that applying an insulation layer of silicon oxide (30) on the completed electrode configuration and a contact opening is formed and filling the contact opening by depositing tungsten or aluminum to form a contact plug (col. 9, lines 36-40).

Schuele et al remain silent about forming at least two contact holes or contact openings with different depths and long overetching is performed due to the different depths of the contact holes.

However, Watabe teaches forming two contact holes (20 and 22) on an insulation layer (41) on an electrode configuration (10), wherein the contact holes having different depths are formed with controlled etching rate for preventing damages

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of a foundation of the semiconductor device (see abstract and paragraphs 0007, 0021, 0032 of the translated version).

Watabe teaches controlling the etch rate depending on the different depths of the contact holes (paragraph 0054) but do not explicitly teach that long overetching is performed due to the different depths of the contact holes.

Watabe teaches the bottom of the contact hole 22 is prevented from being breaking through by controlling the etching rate by changing the size of an opening due to the different depth of the contact holes (see the abstract).

So, it is suggested that the contact holes of Watabe having substantially same diameter as the variation or the changes in the size would have been with in the claimed range of substantially same diameter contact holes.

However, it would have been obvious to one of ordinary skill in the art at the time of claimed invention to perform overetching the electrode configuration because the contact hole (24) is deeper than the contact hole (25) to be formed (figure 29).

So, it is expected that one of ordinary skill in the art would be motivated to over etch the substrate in order to form a deeper trench or contact hole as supported by Hwang.

Wherein, Hwang teaches that it is preferable to perform overetching depending on the desired depth of an opening (col.4, lines 7-9).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to combine Watabe's teaching into Schuele et al's process for

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efficiently connecting conductive layers electrically without damaging the foundation as taught by Watabe.

As to claims 2-5, and 7, Schuele et al teach that the dry etching for the first layer comprises a plasma etching such oxygen based reactive ion etching (col. 8, lines 66-col.9, lines 3).

As to claim 3, Schuele et al teach that the reactive substance will react with the second conductive material to form non-volatile compound because the material of the second conductive material is exactly the same as the instant application such as titanium nitride.

As to claim 14, Schuele et al teach that the first conductive layer (38) works as a barrier or etch stop layer during the chemical dry etching of the second layer (44) (col. 8, lines 50-58 and see figures 12-13).

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schuele et al (5,930,639) in view of Watabe (JP-5-315457) and Hwang (5,621,606) as applied to claims 1-5,7-9, 12-14 and 21-22 above, and further in view of Chung (5,976,394).

Modified Schuele et al discussed above in paragraph 10 but remain silent about the dry etching of the first conductive layer comprises an inert gas.

However, Chung teaches that it is conventional to use a reactive gas such as an inert gas (argon) for efficiently etching platinum (col.1, lines 27-40).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Chung's teaching into modified Schuele et al's method for

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efficiently etching the first conductive layer, which is substantially difficult or substantially unetchable by chemical dry etching without making a reaction product through reaction with platinum as taught by Chung.

12. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuele et al (5,930,639) in view of Watabe (JP-5-315457) and Hwang (5,621,606) as applied to claims 1-5,7-9, 12-14 and 21-22 above, and further in view of Yang et al (5,436,190).

Modified Schuele et al discussed above in paragraph 10 but remain silent about the deposition process of silicon oxide, which can be done by TEOS or by a silane process.

However, in a method of fabricating a semiconductor device, Yang et al teach that deposition of silicon oxide is performed by using a TEOS process or by a silane process (col.4, lines 54-67).

Therefore, it would have been obvious to one skill in the art at the time of claimed invention to combine Yang et al's teaching into modified Schuele et al's process for efficient and easy deposition of silicon oxide as taught by Yang et al.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Shamim Ahmed
Examiner
Art Unit 1765

SA
March 3, 2005

MAHMOUD G. NORTON
SUPERVISORY PATENT EXAMINER

